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14 DEC 1960

MEMORANDUM FOR : The Record

SUBJECT : Trip Report - Pratt & Whitney, Florida
1 and 2 December 1960

REFERENCE : (a) OGC - 1047 dated 7 December 1960
"Accelerated Test Program - engine
Support"
(b) OGC - 0929 dated 10 October 1960
"Weight Status - JT11D-20A Engine"

1. Subject facility was visited primarily to discuss engine support as covered by reference (a) memorandum. Several other areas discussed are felt worthy of mention and, therefore, are described herewith.

2. B-20 engine No. FX-111 has successfully completed 25.5 hours of operation at inlet temperatures corresponding to Mach 3.0 at 72,000 feet altitude and turbine inlet temperatures of 1900°F. This represents the first real test substantiation that the engine will operate at mission inlet temperatures. This particular turbine has accumulated 150 hours operation of which 48 hours were at 1900°F or above. In view of the recent turbine failures, this raises the confidence level and tends to substantiate the P & W theory that the failures were not initiated within the turbine itself.

3. Tests reveal that the latest B-20 compressor configuration is unsatisfactory. Incorporation of tip shrouding on the last five stages reduced performance to an unacceptable level. Incorporation of tubular rim dampers proved structurally inadequate.

(a) The purpose of tip shrouding is to reduce blade vibration.

(b) The purpose of rim dampers is to reduce disc vibration.

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(c) The original D-20 compressor, which revealed exceptional performance during calibration without blade or disc vibration did not have tip shrouding but did have solid rim dampers.

(d) The apparent need for tip shrouding was initiated earlier with the P-2 engine which had neither tip shrouding or rim damping. This engine revealed excessive disc vibration.

(e) Due to blade vendor lead time the tip shrouding was not incorporated in the original compressor (paragraph 3c) but was incorporated in the latest compressor as a matter of course.

(f) Based upon the success of the original D-20 compressor (paragraph 3c), P & W proposed action is to remove the tip shrouding and change to solid rim dampers.

The above will cause some delay in compressor development. It is now expected that this delay will be absorbed and will not be reflected in X or Y engine deliveries.

It is expected that the solid rim dampers, if fabricated from costly austalloy, will be limited to 75 hours operation at [REDACTED]. The tubular rim dampers were intended to be limited to 300 hours at [REDACTED]. 75 hours at [REDACTED] is not an attractive limitation and must be improved before a TBO of 100 hours may be realized.

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4. The engine bill of material weight status as of 16 November 1960 is as follows:

(a)		Cumulative changes relative to "Y" Engine. Spec. Weight of 5657 lbs.
	Weight (lbs)	
Current Eng. Estimate	5879	+222
Cat. 1 Changes Outstanding	-136	+ 36
Cat. 2 Changes Outstanding	- 87	- 51
Cat. 3 Changes Outstanding	- 22	- 73

(b) Since the last weight status report (ref. (b) memorandum), P & W has initiated a change in weight

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accounting. Now, completed design changes are not reflected in the "Current Engine Estimate" until after final project approval. Before, they were included upon completion before final approval. Based upon the "old" system, the current engine estimate tabulated above would read 5734, rather than 5879.

(c) Due to this change in accounting the engine bill of material will not reflect the spec. weight of 5657 lbs. by 30 December 1960, as presented at the Supplier's Meeting of 28 September 1960. It is expected that the bill of material will reflect a weight of 5740 lbs. by 30 December 1960.

5. It has been agreed between Lockheed, P & W, and Ashland Refineries that the 3.5 psia vapor pressure at 300°F as required by Lockheed will be incorporated into fuel spec. HWA-523. A corresponding inspection procedure also will be incorporated which will tend to penalize the fuel at the 50 psia vapor pressure point. This inspection procedure has been accepted reluctantly by Ashland who feels that some additional blending will be required in order to meet the 50 psia point. Upon release, the revised spec. will be presented to Esso and Shell for their comment.

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Development Branch
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DPD/DB/ROD:rew

Distribution:

- 1-DD/P
- 2-C/DB/DPD
- 3-AC/DPD
- 4-C/TAS/DPD
- 5-DPD/DB
- 6-DPD/DB
- 7-DPD/RI